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CASE REPORT

Acute Multifocal Haematogenous Osteomyelitis with Sepsis in a 10 Years Old Child Caused by Methicillin-Resistant Staphylococcus aureus: A Case Report

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ABSTRACT

BACKGROUND

Acute Haematogenous Osteomyelitis is common in children, but the multifocal form, Acute Multifocal Osteomyelitis, is rare and has the potential to involve multiple bones. The usual organism causing acute osteomyelitis in children is Staphylococcus aureus; however, the presence of methicillin-resistant Staphylococcus aureus (MRSA) strains in the community has been associated with increased disease severity. Also, the disease might advance rapidly and result in severe morbidity and mortality if not treated early, but many factors relate to delayed treatment in our part of the world. We present a 10-year-old girl from the rural mountain region of Nepal with acute multifocal haematogenous osteomyelitis with sepsis caused by methicillin-resistant Staphylococcus aureus (MRSA).

KEYWORDS

MRSA, Osteomyelitis

INTRODUCTION

Acute haematogenous osteomyelitis often occurs in children and can lead to a lifelong risk of musculoskeletal deformities.[1] while its multifocal form, i.e., Acute Multifocal Haematogenous Osteomyelitis, is described rarely in literature, it symbolizes a more dangerous form in which the child may not only develop sepsis but also result in mortality as the disease advances rapidly if not treated early.[1]

Staphylococcus aureus is the most commonly isolated microorganism.[2-4] In recent years, the rate of methicillin-resistant *Staphylococcus aureus* (MRSA) infections among children has risen.[5,6] While MRSA is typically regarded as a hospital-acquired pathogen, it is increasingly being contracted within the community.[7] Successful management hinges on early diagnosis, which involves microbiological and pathological sampling to enable targeted and prolonged antibiotic treatment.[5,7]

In this study, we present a case involving a ten-year-old girl from a rural mountainous region of Nepal. She presented with acute multifocal osteomyelitis accompanied by sepsis, attributable to methicillin-resistant Staphylococcus aureus (MRSA). Notably, the patient had never been hospitalized and exhibited no risk factors for MRSA infection.

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CASE REPORT

A 10-year-old girl from a rural Himalayan village in Nepal, who resides in a hostel, presented with pain and swelling in the distal part of her left leg for 11 days following trauma while playing, along with high-grade fever for 8 days. She had no significant past medical and surgical history. Initially, she was treated by a traditional healer, and later, she was taken to medical centers in her village but was referred to a higher center without any interventions being performed.

Initial Presentation

At presentation in the emergency department, she appeared ill, with a temperature of 103.4°F, a Pulse of 136, a blood pressure of 100/60 mmHg, and a Respiratory rate of 30 breaths per minute. There was diffuse swelling involving the left leg, ankle, and foot with a blister over the lateral aspect of the ankle (Fig: 1).

Diagnostic Workup

Her blood parameters are shown in Table 1. Her initial x-ray was normal, MRI showed T2W high signal intensity changes involving the proximal and distal metaphysis of left tibia crossing the growth plate, with large subperiosteal collection predominantly in the anteromedial aspect of the whole length of the tibia extending along the medial and lateral aspect of the ankle and foot (Fig: 2).

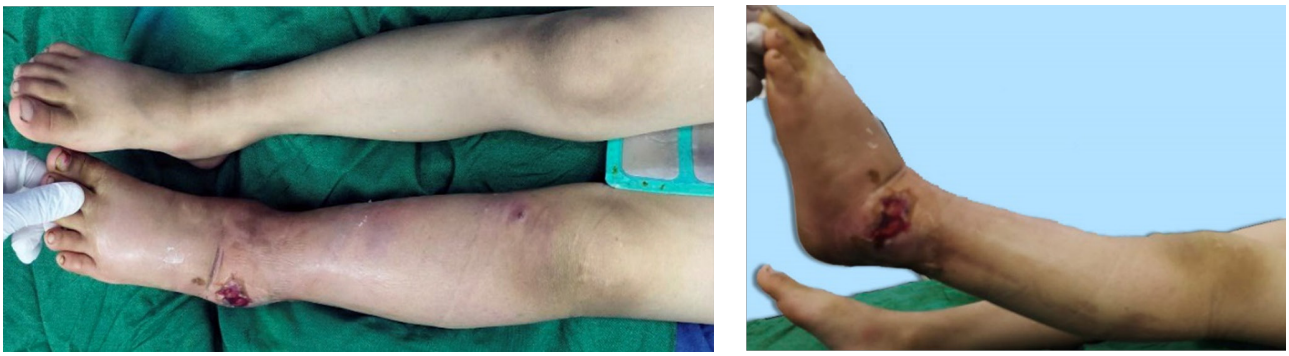

Fig 1: Clinical Picture at time of presentation (Diffuse swelling of left leg and foot with blister over lateral aspect of ankle)

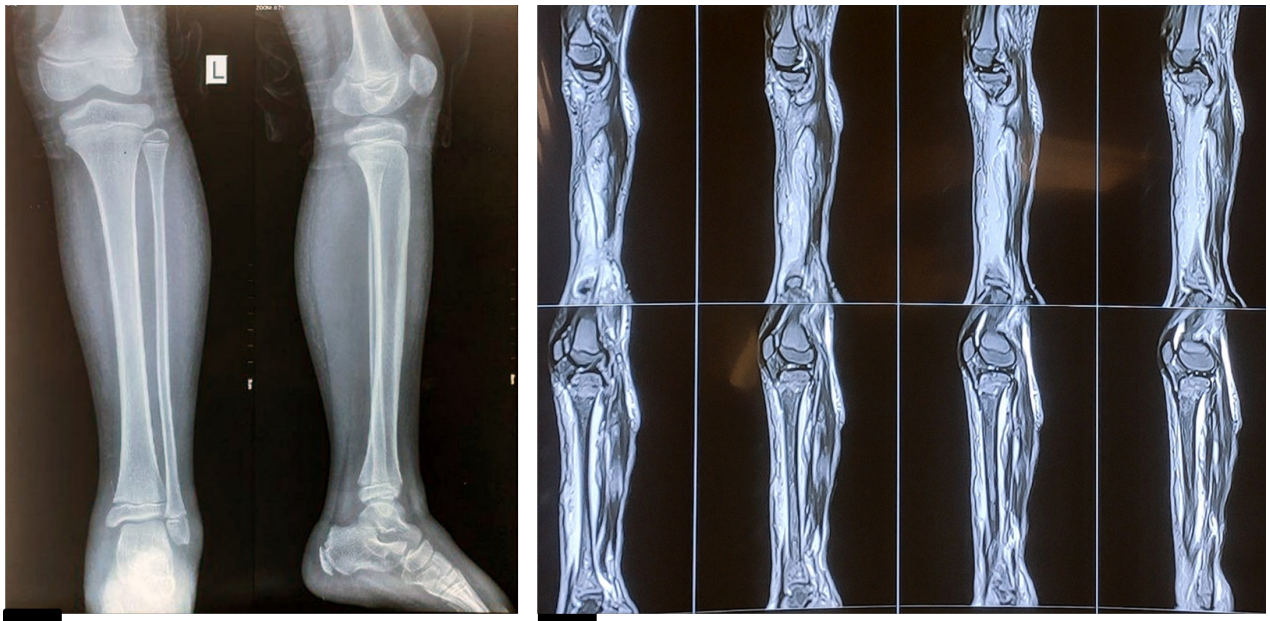

Fig 2: Pre-operative Radiological Imaging (A: X-ray of left leg was normal, B: MRI of the left leg revealed high signal intensity changes in the proximal and distal metaphysis of the left tibia, crossing the growth plate, along with a large sub-periosteal collection mainly on the anteromedial aspect of the tibia, extending to the ankle and foot)

Fig 3: Operative Picture showing pus evacuation and debridement

Table 1: Blood Parameters at the time of presentation and Discharge

Parameter	At the time of presentation	At the time of discharge
CBC	WBC: 5110/ cumm, N 85%, L14%, Hb: 10.37g/dl, PCV: 30.5%, Platelet: 1,28,000/ cumm	WBC: 6640/ cumm, N: 80%, L17% Hb: 8.99g/dl, PCV: 25.3%, Platelet: 1,35,000/cumm
ESR	129 mm/hr	40 mm/hr
CRP	416.7 mg/L	<5 mg/L
PT/INR	22.3/ 1.67	17.3/ 1.26
Procalcitonin	49.09 µg/L	-

Management

She underwent emergency evacuation of pus and intramedullary decompression where around 250ml of pus was evacuated (Fig: 3). She was managed in the intensive care unit with IV broad-spectrum antibiotics (Amoxicillin with clavulanic acid and Ofloxacin), analgesics, and fluids. Her Tissue and pus culture showed growth of Staphylococcus aureus (MRSA), which was sensitive to antibiotics including Imipenem, Linezolid, Teicoplanin, and Vancomycin. In contrast, her blood culture was negative. Consequently, the IV antibiotics were changed to Linezolid.

Post-operative Course

On 2nd POD, she developed B/L pneumonia and went into respiratory distress on 4th POD (Fig: 4), for which she was intubated and placed on a mechanical ventilator. She was managed by a multidisciplinary team that included an orthopedic surgeon, a pediatrician, a critical care intensivist, and a physiotherapist.

Fig 4: Chest X-ray showing bilateral consolidation with white out hemi-thorax (left)

During the postoperative period, she subsequently developed an abscess over her bilateral forearm, right foot, and right shoulder, for which she underwent debridement (Fig: 5). She recovered from respiratory distress and was extubated on the 12th POD. She also developed epiphyseal separation of left proximal and distal tibia at 16th POD, which was fixed with k-wires (Fig: 6). Total hospital stay was 40 days. The blood parameters at the time of discharge are given in Table 1.

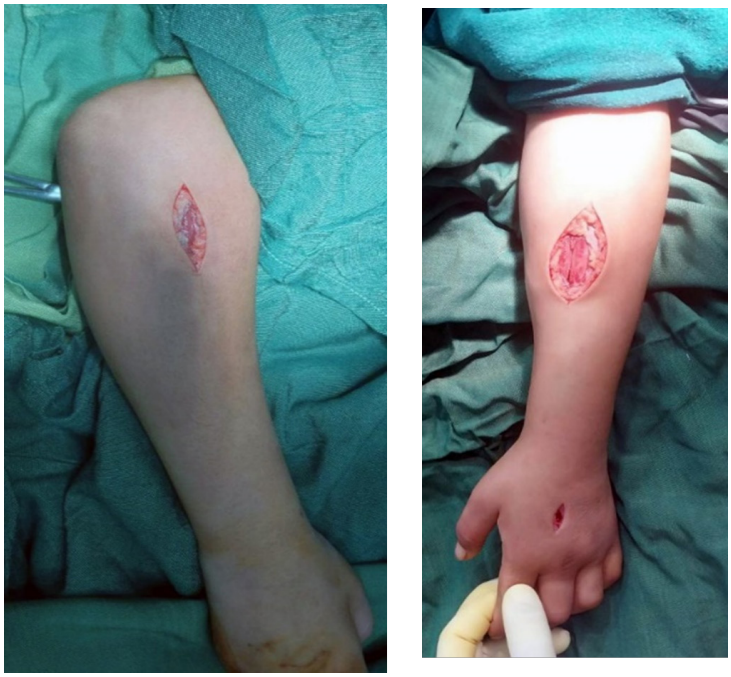

Fig 5: Per-operative Picture (debridement over bilateral forearm following abscess formation)

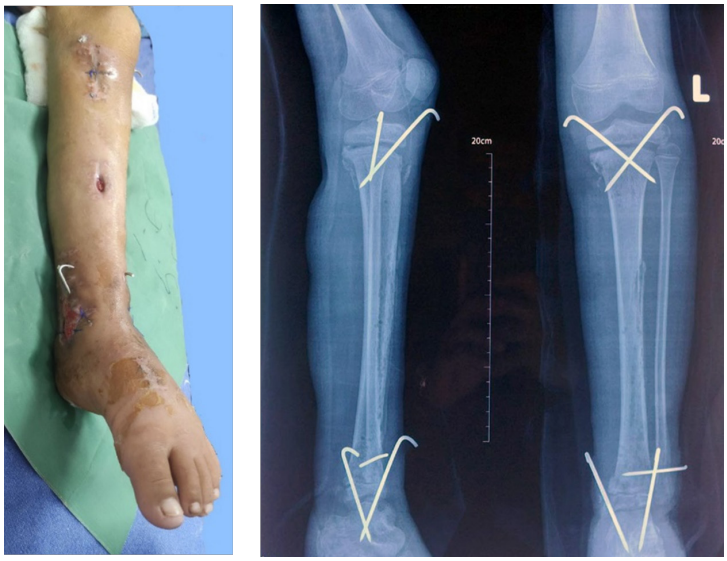

Fig 6: Picture showing k-wire fixation for epiphyseal separation

DISCUSSION

Multifocal osteomyelitis is more commonly seen in neonates than in older children.[1,8] The delay in early recognition and treatment may result in a multifocal form, which has dire consequences

that may lead to significant morbidity or even mortality. A study by Labbé et al. reported that 9.5% of children with acute osteomyelitis develop multiple osseous lesions and systematic infection.[9] 9 In Nepal, various factors, including ignorance, illiteracy, superstition, economic constraints, and difficult transportation, delay the early recognition and treatment of the disease. As a result, patients often present too late, which complicates the treatment process and makes it frequently challenging.

Staphylococcus aureus remains the most common etiologic agent of acute osteomyelitis in children; however, in recent years, the rate of methicillin-resistant Staphylococcus aureus (MRSA) infections among children has increased. MRSA has greater virulence and invasiveness compared to methicillin-sensitive S. aureus, leading to complicated and deep tissue infections, including those affecting skeletal muscle, which necessitate more thorough assessment and treatment.[10] A study by Saavedra-Lozano et al. has shown the changing trends in acute osteomyelitis where methicillin-sensitive S. aureus accounted for 57% of cases of acute osteomyelitis between the year Jan 1999- Jun 2001, which decreased to 40% in the year July 2001- Dec 2003, consequently during that time the cases of MRSA osteomyelitis drastically increased from 6% to 31%.[11] The presence of MRSA Strains in the community has shown the increased severity of the disease, which is more likely to cause high-grade fever, infection of adjacent joints, and metastatic abscess.[5] Sreenivas et al. has reported 26 children with acute multifocal haematogenous osteomyelitis over a period of 5 years where predominant microorganism isolated was S. aureus, among which MRSA was found in 50% of the patients.[1]

The primary challenge in treating MRSA osteomyelitis is the development of antibiotic resistance. A multi-centric study conducted in China to evaluate the antibiotic sensitivity in children with methicillin-resistant Staphylococcus aureus infection has shown that community-acquired MRSA doesn't show resistance to vancomycin and linezolid.[12] In this study, vancomycin and linezolid were found to be sensitive; linezolid was preferred, as both injectable and oral forms were available.

Epiphyseal separation as a complication of osteomyelitis is extremely rare and has been reported in literature. Pawar et al. reported a complete separation of femoral epiphysis associated with chronic osteomyelitis of femoral shaft fracture in young children.[13] Similarly, Pandey et al. reported a case of femoral head physis separation with partial resorption of the femoral head following chronic osteomyelitis of femoral diaphysis in a young child.[14] The epiphyseal separation may be attributed to osteomyelitis involving the metaphysis and epiphysis, i.e., transphyseal involvement, a finding also observed in this case report. Gilbertson-Dahdal et al. have reported that transphyseal osteomyelitis occurs more frequently in pediatric patients (81%). Furthermore, 100% of the MRSA cases exhibited transphyseal extension of osteomyelitis.[15]

CONCLUSION

Acute multifocal haematogenous osteomyelitis is a rare but severe condition in children that requires early recognition and prompt treatment to prevent significant morbidity.

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